Reducing Avoidable Deaths Among Veterans: Directing Private-Sector Surgical Care to High-Performance Hospitals

William B. Weeks, MD, MBA, Alan N. West, PhD, Amy E. Wallace, MD, MPH, Richard E. Lee, MA, MPH, David C. Goodman, MD, Justin B. Dimick, MD, MPH, and James P. Bagian, MD, PE

Objectives. We quantified older (65 years and older) Veterans Health Administration (VHA) patients' use of the private sector to obtain 14 surgical procedures and assessed the potential impact of directing that care to high-performance hospitals.

Methods. Using a merged VHA–Medicare inpatient database for 2000 and 2001, we determined where older VHA enrollees obtained 6 cardiovascular surgeries and 8 cancer resections and whether private-sector care was obtained in high- or low-performance hospitals (based on historical performance and determined 2 years in advance of the service year). We then modeled the mortality and travel burden effect of directing private-sector care to high-performance hospitals.

Results. Older veterans obtained most of their procedures in the private sector, but that care was equally distributed across high- and low-performance hospitals. Directing private-sector care to high-performance hospitals could have led to the avoidance of 376 to 584 deaths, most through improved cardiovascular care outcomes. Using historical mortality to define performance would produce better outcomes with lower travel time.

Conclusions. Policy that directs older VHA enrollees' private-sector care to high-performance hospitals promises to reduce mortality for VHA's service population and warrants further exploration. (*Am J Public Health.* 2007;97:2186–2192. doi:10.2105/AJPH.2007.115337)

Since its reorganization in 1996, the Veterans Health Administration (VHA) has made a major institutional commitment to improve the quality of the care provided to veterans.[1] As part of this effort, VHA has built a nationwide electronic medical record that includes physician order entry (an electronic prescribing system). This electronic record has facilitated the development of a performance measurement and feedback system that evaluates a variety of quality-of-care indicators: access to care (e.g., wait times to appointments), adherence to evidence-based guidelines (e.g., diabetic foot and retinal examinations), and both medical[2] (e.g., hypertension or glycemic control) and surgical (e.g., risk-adjusted general[3] and cardiothoracic surgery[4]) outcomes.

Although these efforts focus on the care that veterans obtain within the VHA system, many VHA patients also receive care in the private sector. Most VHA patients who are 65 years and older are concurrently enrolled in Medicare[5,6] and are known to obtain much of their routine outpatient care,[6,7] acute cardiac care,[8,9] and elective coronary revascularizations[10–12] in the private sector. Surveys of younger VHA patients also report frequent use of private-sector care.[13–15]

Frequent use of private-sector care raises the possibility that outcomes could also be improved by influencing the care that VHA patients receive outside of the VHA. Directing patients to higher-quality care would seem particularly important for common, high-risk procedures that show substantial variation in outcomes across hospitals,[16,17] and it has been proposed as a mechanism to improve outcomes among the Medicare population.[18,19] To determine the magnitude of the opportunity to improve outcomes for VHA patients who undergo high-risk procedures, we linked VHA and Medicare databases to determine how frequently VHA patients obtain these procedures in the private sector and to assess the potential impact of directing their care to high-performance hospitals (based on historical performance and determined 2 years in advance of the service year).

METHODS

We conducted a retrospective study of veterans 65 years and older who (1) were patients in the VHA health care system during 2000 and 2001 and (2) obtained, in either a VHA or a Medicare-funded private-sector hospital, any of 14 procedures that have nontrivial mortality rates and show hospital-specific variation in 30-day risk-adjusted mortality among Medicare beneficiaries.[17] These procedures included 6 cardiovascular procedures (coronary artery bypass grafting [CABG] surgery, carotid endarterectomy, lower extremity bypass surgery, aortic valve replacement, elective abdominal aortic aneurysm repair, and mitral valve replacement) and 8 cancer resection procedures (colectomy, lobectomy, nephrectomy, gastrectomy, cystectomy, pancreatectomy, pneumonectomy, and esophagectomy).

Emergent cardiovascular cases and non–cancer-related resection procedures were eliminated from the analysis. The *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*)[20] codes and specifications used to define these procedures are provided in Table 1. We used data from several sources to answer 3 questions: (1) How many of these procedures do VHA patients obtain in VHA or the private sector? (2) Do VHA patients obtain private-sector procedures in high-performance hospitals? (3) What are the mortality and travel time implications of directing veterans' private-sector care to high-performance hospitals?

TABLE 1—Surgical Procedures Performed on Veterans Health Administration (VHA) Patients 65 Years and Older and Their Use of These Procedures in the Private Sector and VHA: 2000–2001

Surgical Procedure	*ICD-9-CM* Procedure Codes	Specifications	Medicare-Funded Private Sector: All, No.	Medicare-Funded Private Sector: VHA Ranked Hospitals, No.[a]	Older Veterans' Medical Center, No.	Reliance on VHA, %[b]
Cardiovascular procedures			101 300	98 193	15 205	13.1
CABG surgery	36.10–36.19	Exclude concomitant valve repair (35.11–35.14, 35.21–35.25, 35.28)	45 536	43 548	5 354	11
Carotid endarterectomy	38.12	None	25 814	25 397	4 603	15
Lower extremity bypass	39.29	Exclude upper extremity arteries (444.21) and ESRD (585 or 586)	12 645	12 440	2 529	17
Aortic valve replacement	35.23 or 35.24	None	8 147	7 868	1 165	13
Elective AAA repair	38.44 or 39.25 without 38.45	Include only AAA without rupture (441.4, 441.7, 441.9, but not other 441s)	6 902	6 808	1 298	16
Mitral valve replacement	35.21 or 35.22	None	2 256	2 132	256	10
Cancer resections		Include only with concomitant:	17 945	17 488	4 867	21.3
Colectomy	45.73–45.76	Colon cancer (153–153.9, 154.0)	8 895	8 795	2 547	22
Lobectomy	32.4	Lung cancer (162–165.9)	3 399	3 339	864	20
Nephrectomy	55.51 or 55.52	Kidney or urinary cancer (189–189.9)	2 624	2 566	585	18
Gastrectomy	43.5–43.99	Stomach cancer (151–151.9)	1 166	1 106	268	19
Cystectomy	57.7–57.79	Bladder, kidney or urinary cancer (188–189.9)	658	616	243	27
Pancreatic resection	52.51, 52.53, 52.7	Duodenal, biliary, or pancreatic cancer (152–152.9, 156–157.9)	461	407	102	18
Pneumonectomy	32.5	Lung cancer (162–165.9)	401	367	130	24
Esophagectomy	42.40–42.42, 43.99	Esophageal cancer (150–150.9)	341	292	128	27
Total procedures obtained during 2000–2001			119 245	115 681	20 072	14.4

Note. ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification[20]; CABG = coronary artery bypass grafting; ESRD = end stage renal disease; AAA = abdominal aortic aneurysm.
[a]Private-sector hospitals whose past performance on a given surgical procedure we were able to rank.
[b]Percentage of all procedures (VHA plus Medicare) performed in VHA.

Identification of Veterans Health Administration Patients

From VHA administrative databases, we identified veterans who were 65 years or older and enrolled in the VHA health care system in 2000 or 2001 ("VHA patients"). Enrollment was defined as being listed in the VHA enrollment file and using VHA health services within the prior 3 years. These criteria were adopted for 2 reasons. First, the VHA enrollment file was established to identify patients for whom VHA has an obligation to provide a medical benefits package.[21] Second, service use within 3 years "vests" patients (i.e., classifies them as endowed with rights for services) for the purposes of administering the Veterans Equitable Resource Allocation system, a method of allocating VHA's congressionally appropriated budget across geographically defined service networks. Both enrollment and vesting are used to define the VHA service population—essentially, the "covered lives" for whom VHA has a potential medical benefits liability—and replicate methods used previously.[7,22,23]

Health Service Use

VHA use. To determine whether older VHA patients obtained any of these procedures in the VHA system, we used *ICD-9-CM* codes from the acute care section of the VHA's Medical SAS Inpatient data sets.[24] These patient treatment file data sets are national administrative data for VHA-provided health care that are extracted from the National Patient Care Database, which is maintained by the VHA Office of Information at the Austin Automation Center, the central repository for VHA data. These data sets include information on the veteran, such as age at procedure and zip code of residence, as well as a date-of-death variable, which we used to calculate crude 30-day mortality for these procedures.

Private-sector, Medicare-funded use. Each year, the VA Medicare Data Merge Initiative[25] submits to the Centers for Medicare and Medicaid Services (CMS) a file of social security numbers of veterans known to VHA as eligible or potentially eligible to receive health care through VHA; the CMS then extracts Medicare enrollment and claims data for these social security numbers.[26] To determine whether older VHA patients obtained any Medicare-funded procedures in the private sector, we used *ICD-9-CM* codes from hospitalizations in this VA–Medicare data set. From the claims data, we obtained the Medicare provider number for the facility where the procedure was obtained, and we identified the procedure-specific performance quintile for the hospital, as described in the next section.

Identification of High- and Low-Performance Private-Sector Hospitals

We used an established method used by Birkmeyer et al.[17,27] to rank the performance of hospitals that were reimbursed by Medicare for providing these 14 surgical procedures between 2000 and 2001. We ranked them on 2 parameters that have been predictive of future performance: historical procedure volume (i.e., the average annual number of procedures performed at a particular hospital in the recent past) and historical risk-adjusted mortality. Rankings were based on the results of 2 logistic regression models used to predict surgical mortality (defined as death during hospitalization or within 30 days of discharge), which we risk-adjusted for age, gender, and comorbidities.

To reflect the reality of the lag time necessary to obtain the data required to pursue this strategy, we applied standards based on the actual availability of data. For example, we used data from 1996 to 1998 to calculate hospital-specific average annual procedure volumes and risk-adjusted mortality, and from those figures we estimated hospitals' expected performance in 2000 and ranked them accordingly. Because a small minority of hospitals were new and did not have historical information from the period examined, we were not able to rank every hospital (the total number of each procedure performed in the private sector and the number we were able to match to ranked hospitals are provided in Table 1). However, to be conservative, we used "intent-to-treat" analytic methods; that is, we included even the patients whom we were not able to link to ranked hospitals in our denominator.

We aggregated hospitals into quintiles on the basis of each hospital's rank on either volume or mortality, with quintile 1 representing the highest performance level (highest expected procedural volumes or lowest expected operative mortality) and quintile 5 representing the lowest performance level. Constructing these quintiles required several steps. First, we listed the hospitals in descending order of historical volume or risk-adjusted mortality rank. Second, we calculated the total number of each procedure performed in all Medicare hospitals over each year and divided the total volume into quintiles. We then used hospital-specific volumes to assign each hospital to the appropriate quintile. Hospitals whose procedures fell across 2 quintiles were assigned to the higher-performance quintile.

Effect of Directing Private-Sector Care to High-Performance Hospitals

For either volume or mortality, we defined high-performance hospitals as those in the best 2 quintiles. Although we considered examining only hospitals in the first quintile, doing so would have severely limited geographic access and rendered the additional travel time overly burdensome. To determine the mortality effect of directing care to high-performance hospitals, we compared expected mortality based on actual performance and VHA patients' use patterns in 2000 and 2001 ("actual") to those expected if patients had been directed to high-performance hospitals ("with direction").

Directing care to high-quality hospitals is likely to cause additional travel time for patients.[18] Using a methodology that accounts for distance, speed limits, and traffic congestion,[28] we computed travel time from the patient's zip code of residence to the private-sector hospital where care was provided as well as to the nearest high-performance hospital. We then calculated the additional travel time associated with directing private-sector care: the difference between the travel time to the hospital where care might have been provided ("with direction") and the travel time to where it actually was ("actual").

Therefore, to determine the potential effect on mortality and travel time of directing veterans to high-performance private-sector care, we calculated the expected risk-adjusted mortality and travel times using 2 scenarios: actual and with direction. We compared the 2 scenarios and applied the change in expected risk-adjusted mortality to calculate potential lives saved.

Considering Veterans Health Administration Performance

Finally, we used data from the VHA inpatient data sets to determine the volume of each procedure performed at each VHA medical center where that procedure was performed. For each procedure examined, we determined the number of VHA medical centers whose procedure volumes among VHA patients 65 years or older were at least as high as the minimum private-sector volume in the second-best quintile for Medicare beneficiaries who were 65 years or older. In addition, we calculated procedure-specific crude 30-day mortality for veterans who obtained these procedures in the VHA system and compared them with procedure-specific crude 30-day mortality for private-sector hospitals, weighted to represent VHA patients' actual use of those hospitals as well as modeled use of hospitals, on the basis of direction of private-sector care.

RESULTS

Veterans Health Administration Patients' Use of the Private Sector

Over the 2-year study period, older veterans who were enrolled in VHA obtained a total of 139 317 procedures: 119 245 (85.6%) were obtained in the private sector, funded by Medicare, and 20 072 (14.4%) were obtained in VHA (Table 1). VHA provided only about one eighth of the cardiovascular procedures that these older veterans received and a little more than one fifth of their cancer resections. Reliance on VHA was greatest for cystectomies and esophagectomies, VHA providing more than one fourth of these procedures.

Distribution of Private-Sector Care Across Performance Quintiles

Ninety-seven percent of these high-risk procedures were obtained in hospitals that we were able to rank by performance quintile. By definition, the expected distribution of patients, assuming that older VHA enrollees' use of the private sector was similar to that of the overall Medicare population, was 20% in each quintile. With only a few exceptions among the less-common surgeries, and regardless of procedure and of whether performance was defined by historical volume or historical risk-adjusted mortality, we found that VHA patients used lower- and higher-performance hospitals at close to expected rates (data not shown).

Effect of Directing Private-Sector Care to High-Performance Hospitals

If VHA patients who were already using the private sector had obtained their private-sector care in only the best 2 performance

quintiles, between 376 and 584 lives could have been saved, depending on the method used to define performance (Table 2). If these patients had been directed to historically high-volume centers for their procedures, expected mortality would have decreased by 6.7% (from 4.76% to 4.44%), potentially saving 376 lives during the 2 years. Directing private-sector care to medical centers with a history of low risk-adjusted mortality would have decreased expected mortality by 10.1% (from 4.93% to 4.43%), potentially saving 584 lives. Under either scenario, about half of the potential lives saved would come from directing private-sector CABG surgery and aortic valve replacement to high-performance hospitals.

With performance based on historical volumes, substantial travel time would be associated with directing patients to better private-sector care. Directing patients to high-performance CABG surgery and aortic valve replacement hospitals would have led to mean additional travel times of 61 and 54 minutes, respectively, but would have saved 188 lives. Alternatively, with performance based on historical risk-adjusted mortality, a much more modest travel time would be associated with directing private-sector care. Under that scenario, directing patients to high-performance CABG surgery and aortic valve replacement hospitals would have led to a mean additional travel time of 20 and 15 minutes, respectively, and would have saved 318 lives.

We show the application of private-sector performance to VHA care in Table 3. For each procedure, we used the minimum annual volume for private-sector hospitals in the best 2 quintiles based on historical volumes and counted the VHA medical centers that met this volume threshold. We found that only a few VHA medical centers performed enough procedures annually to meet these volume standards; none did so for CABG surgery or aortic valve replacement. For each procedure, we also compared its actual crude 30-day mortality in the private sector to the likely 30-day crude mortality if care had been directed to better hospitals, on the basis of historical mortality rates as well as the VHA 30-day crude mortality rate. For 13 procedures, on the basis of actual use, expected crude mortality rates were lower in the private sector, whereas for 1 procedure—carotid endarterectomy—they were lower for VHA care, an advantage that disappeared when we compared results that would have been expected in high-performance private-sector hospitals.

TABLE 2—Potential Effect on Mortality and Travel Time of Directing Veterans to High-Performance Private-Sector Care, by Procedure

	Expected Risk-Adjusted Mortality, %			Travel Time, min		
	Actual	With Direction	Potential Lives Saved, No. (%)	Actual	With Direction	Additional Time
Performance on the basis of historical volumes						
Cardiovascular procedures						
CABG surgery	5.0	4.7	124 (33.1)	38.9	100.2	61.3
Carotid endarterectomy	1.5	1.5	17 (4.6)	32.9	57.4	24.5
Lower extremity bypass	5.3	5.0	28 (7.5)	30.5	54.1	23.6
Aortic valve replacement	8.5	7.7	64 (17.1)	46.9	101.0	54.1
Elective AAA repair	5.9	5.4	35 (9.4)	38.8	68.1	29.3
Mitral valve replacement	13.9	13.4	10 (2.7)	46.7	102.8	56.1
Cancer resections						
Colectomy	6.4	6.1	34 (9.1)	23.1	44.9	21.8
Lobectomy	5.3	4.9	14 (3.7)	39.2	72.1	32.9
Nephrectomy	3.0	2.7	6 (1.5)	34.0	60.9	27.0
Gastrectomy	10.9	9.7	13 (3.5)	35.6	69.7	34.1
Cystectomy	5.1	4.2	5 (1.4)	45.7	88.0	42.3
Pancreatic resection	9.4	5.8	15 (3.9)	51.9	116.8	64.9
Pneumonectomy	15.6	15.3	1 (0.3)	53.2	107.2	54.0
Esophagectomy	12.6	9.6	9 (2.3)	62.5	147.4	84.9
Total	4.76	4.44	376 (100)			
Performance on the basis of historical mortality						
Cardiovascular procedures						
CABG surgery	5.2	4.7	229 (39.2)	38.9	58.8	19.9
Carotid endarterectomy	1.6	1.5	24 (4.1)	32.9	37.2	4.3
Lower extremity bypass	5.4	5.0	39 (6.8)	30.5	34.7	4.2
Aortic valve replacement	8.8	7.7	89 (15.2)	46.9	62.3	15.4
Elective AAA repair	6.0	5.4	41 (7.0)	38.8	46.8	8.0
Mitral valve replacement	14.7	13.4	26 (4.5)	46.7	65.2	18.5
Cancer resections						
Colectomy	6.5	6.1	40 (6.8)	23.1	28.4	5.3
Lobectomy	5.4	4.9	18 (3.0)	39.2	49.2	10.0
Nephrectomy	3.0	2.8	7 (1.2)	34.0	41.1	7.1
Gastrectomy	11.5	9.7	20 (3.4)	35.6	46.1	10.5
Cystectomy	5.4	4.1	8 (1.4)	45.7	65.0	19.3
Pancreatic resection	10.6	5.4	21 (3.6)	51.9	86.5	34.6
Pneumonectomy	17.0	15.5	6 (1.0)	53.2	83.8	30.7
Esophagectomy	14.7	9.2	16 (2.8)	62.5	88.1	25.5
Total	4.93	4.43	584 (100)			

Note. CABG = coronary artery bypass grafting; AAA = abdominal aortic aneurysm. "Actual" refers to expected mortality based on actual performance and Veterans Health Administration patients' use patterns in 2000 and 2001; "with direction" refers to mortality expected if patients had been directed to high-performance hospitals. See "Methods" section.

DISCUSSION

We found that the large majority of older VHA patients' cardiovascular procedures and cancer resections were provided in the private sector. These patients and their doctors did not appear to select high-performance private-sector hospitals; instead, VHA patients were

TABLE 3—Potential Results of Applying Private-Sector Standards to Veterans Health Administration (VHA) Care

Surgical Procedure	Application of Volume Standards: Minimum Annual No. of Procedures[b]	Application of Volume Standards: No. of VHA Centers Meeting Standard	Application of Mortality Rates (Crude, 30-Day), %[a]: Actual	With Direction	Concurrent VHA
Cardiovascular procedures					
CABG surgery	279	0	5.2	4.7	5.5
Carotid endarterectomy	71	2	1.6	1.4	1.4
Lower extremity bypass	35	4	5.3	5.0	6.6
Aortic valve replacement	52	0	8.8	7.7	11.3
Elective AAA repair	26	2	6.0	5.4	7.3
Mitral valve replacement	23	0	14.7	13.6	16.4
Cancer resections					
Colectomy	26	5	6.5	5.9	7.5
Lobectomy	13	3	5.4	4.8	8.6
Nephrectomy	7	5	3.0	2.7	3.7
Gastrectomy	4	4	11.5	9.4	18.2
Cystectomy	4	2	5.4	4.0	9.1
Pancreatic resection	3	0	10.6	5.0	16.7
Pneumonectomy	2	10	17.1	15.3	22.3
Esophagectomy	2	11	15.4	9.3	19.5

Note. CABG = coronary artery bypass grafting; AAA = abdominal aortic aneurysm. "Actual" refers to expected mortality rates based on actual performance and Department of Veterans Affairs patients' use patterns in 2000 and 2001; "with direction" refers to rates expected if patients had been directed to high-performance hospitals. See "Methods" section.
[a]The percentage of patients who died within 30 days of discharge.
[b]Derived from private-sector Medicare data.

equally likely to obtain care in low- and high-performance surgical centers. We found that directing VHA patients' private-sector care to high-performance hospitals might save a substantial number of lives. When high performance in the private sector is defined by historical risk-adjusted mortality, directing care would save more lives and minimize additional travel time.

Our findings are important for several reasons. First, they confirm that VHA patients are distributed evenly across private-sector hospitals of varying performance. To be sure, the influence of publicly released outcomes data does not appear to influence hospital choice for most private-sector patients.[29–31] However, our study suggests a potential new role for VHA—that of taking an active role in coordinating private-sector care for VHA enrollees. Indeed, through cooperative efforts between VHA and the CMS, the VHA may be able to influence the quality of care received by veterans treated outside of VHA facilities by providing incentives for these patients to obtain private-sector care in high-performance hospitals.

Second, our analysis suggests that efforts at directing private-sector care could if necessary be focused on a limited number of procedures. Although every potential life saved is important, our findings suggest that prioritizing CABG surgery and aortic valve surgery would be the most productive and efficient approach to saving lives. Further, our results indicate that veterans would not bear an undue travel burden if such a program is implemented.

Finally, our findings suggest that a focus on improving the quality of VHA enrollees' private-sector care is likely to have a greater payoff than a focus on improving care provided within VHA, for 3 reasons. First, directing private-sector care is feasible. The Leapfrog Group[32] and other health care purchasers, including the CMS,[18] have examined the benefits of restricting care to high-performance hospitals. Particularly if coordinated with Medicare, VHA could adopt a combined health maintenance organization (HMO)–insurer approach to managing the outcomes of its overall service population.

Second, because of the much greater volume of private-sector care, smaller improvements on outcomes can have a greater impact on the VHA's service population than could additional efforts to improve VHA care. Given the volumes and crude mortality rates for VHA care for these procedures, an overall reduction in the VHA's crude mortality rates for all procedures of 52% would be required to save the same number of lives that could be saved through directing private-sector care to high-performance hospitals. VHA crude mortality rates would then be approximately one half the rates of top private-sector performers, an unrealistic goal for improvement for any health care provider, particularly because patients who obtain these procedures within VHA are more likely to be sicker, poorer, and uninsured, rendering risk-adjusted mortality reduction much harder to achieve.

Third, although some might argue that an alternative to directing private-sector care would be to direct care into the VHA system, this strategy might not be as effective or efficient: relatively few VHA sites provide these services, and the costs of absorbing dramatic increases in volume would be prohibitively high.

Limitations

Our study has several limitations. First, the risk-adjusted mortality rates that we obtained from our analysis of Medicare hospitals were not gender specific. This raises the possibility that rates may be different for VHA patients—the vast majority of whom are men—who use the private sector. However, gender was incorporated into the risk-adjustment methodology, and we recently found that a risk-adjustment model used by New York State applies well to male VHA patients who use the private sector for CABG.[23]

Second, we used crude, 30-day mortality rates to consider the relative performance of veterans' actual and potential use of the private sector and VHA. Because sicker, uninsured, and poor veterans are more likely to use VHA for inpatient services, risk adjustment would be required for comparison of true performance; therefore, no conclusions

should be drawn regarding the relative performance of VHA and the private sector from this analysis.

Third, our analysis assumes 100% patient compliance with direction of care. Established practice and referral patterns, as well as patient indifference toward publicly reported data, suggest that VHA would need to play an active role to achieve the potential benefits of directed care that we project. Further, directing private-sector care for patients who only sporadically use the VHA system may be particularly challenging. However, the very high rate at which Medicare funds VHA patients' private-sector care suggests that coordination of care with the CMS, and potentially sharing financial incentives to obtain care in high-performance settings, may be an effective way to influence VHA patients' choice of a private-sector hospital for high-risk surgery.

Fourth, although the VA–Medicare data set should capture all Medicare-funded private-sector procedures, not all older VHA patients' private-sector procedures are paid for by Medicare, even for those patients enrolled in Medicare. By law, after Medicaid, Medicare is the payer of last resort; therefore, commercially insured older veterans who obtained these procedures in the private sector and whose insurance fully covered the costs of the procedures were not included in our analysis. Using a comprehensive VHA–private-sector data set from New York for the years 1998 through 2000,[12,23] we found that 8.5% of private-sector CABG surgeries obtained by older VHA enrollees were not paid for by Medicare. Although the proportion of procedures obtained by older Medicare- and VHA-enrolled patients that are not paid for by Medicare probably vary by procedure, our results should be considered a lower bound for the potential effects of directing patients to better private-sector care.

Implications for Further Research

Our theoretical findings raise an important practical consideration: who might pay for administrative or patient incentive expenses associated with coordination of care? The answer, of course, depends on which parties might benefit from such an arrangement and to what relative degrees. To address those questions, we propose that VHA and Medicare collaborate on a demonstration project for Medicare-enrolled VHA patients as follows: VHA would provide the administrative infrastructure required to facilitate direction of care to high-performance hospitals and would be allowed to provide incentives for veterans to pursue higher-quality care through partial subsidy of their Medicare co-payment; cost savings associated with avoided complications would accrue to VHA, up to the point of VHA's subsidy liability.

This model would benefit several parties. First, VHA and Medicare should be interested in improving the quality of care provided to their service populations; further, they should realize indirect financial benefits through reduced liability from surgical complications[33] or early payment of death or disability benefits. High-performance hospitals that perform these procedures might benefit from additional volume and higher co-payment receipt rates, thereby reducing the charity care that, no doubt, they frequently supply to VHA patients. Finally, veterans would retain hospital choice—they could choose a low-performance hospital and not receive the subsidy, but those who chose high-performance hospitals and the subsidy might have lower out-of-pocket health care costs and better outcomes. Although compromises regarding the optimal distribution of financial obligations—such as whether high-performance hospitals might accept lower, but guaranteed, co-payments or whether veterans might accept co-payment reduction instead of elimination—might be negotiated, none of the potential benefits that might accrue to these parties could be realized until a demonstration project was conducted.

Conclusions

Our findings suggest that VHA should consider focusing quality improvement efforts on the care that VHA patients receive in the private sector, particularly for the high-mortality procedures that VHA patients frequently obtain. The impact of directing VHA patients who use the private sector to the highest-performing hospitals should have a greater effect on the service population than should efforts directed exclusively internally. VHA has a commitment to provide safe, high-quality care to its enrolled service population. One effective mechanism to meet this obligation is to help ensure the quality of care provided to veterans outside of VHA's walls. ■

About the Authors

William B. Weeks is with the Veterans Administration (VA) Outcomes Group Research Enhancement Award Program, VA Medical Center, White River Junction, Vt, and the Department of Psychiatry, Dartmouth Medical School, and the Dartmouth Institute for Health Policy and Clinical Practice, Hanover, NH. Alan N. West and Richard E. Lee are with the VA Outcomes Group Research Enhancement Award Program, VA Medical Center, White River Junction. Amy E. Wallace is with the VA Outcomes Group Research Enhancement Award Program, VA Medical Center, White River Junction, and the Department of Psychiatry, Dartmouth Medical School, Hanover. David C. Goodman is with the Department of Pediatrics, Dartmouth Medical School, and the Dartmouth Institute for Health Policy and Clinical Practice, Hanover. Justin B. Dimick is with the VA Outcomes Group Research Enhancement Award Program, VA Medical Center, White River Junction, and the Department of Surgery, University of Michigan, Ann Arbor. James P. Bagian is with the Veterans Health Administration and the VA National Center for Patient Safety, Ann Arbor, Mich, and the Department of Military and Emergency Medicine, Uniformed Services University of the Health Sciences, F. Edward Hebert School of Medicine, Bethesda, Md.

Requests for reprints should be sent to William B. Weeks, MD, MBA, 215 N Main St, VAMC (11Q), White River Junction, VT 05009 (e-mail: wbw@dartmouth.edu).

This article was accepted June 22, 2007.

Contributors

W.B. Weeks originated the study and supervised all aspects of its implementation. A.N. West, A.E. Wallace, and R.E. Lee assisted with the study, completed or assisted with the analyses, and made substantial contributions to the article's content. D.C. Goodman and J.B. Dimick conducted specific analyses necessary for completing the study. J.P. Bagian helped develop the study conceptually and assisted with policy implication development.

Acknowledgments

This work was supported by VA Health Services (grants ACC 01-117, IIR 04-236, and REA 03-098).

Note. The views expressed in this article do not necessarily represent the views of the Department of Veterans Affairs or of the US Government.

Human Participant Protection

This study was approved by Dartmouth Medical School's Committee for the Protection of Human Subjects.

References

1. Kizer K. *Prescription for Change.* Washington, DC: Department of Veterans Affairs; 1996.

2. Jha AK, Perlin JB, Kizer KW, Dudley RA. Effect of the transformation of the Veterans Affairs Health Care System on the quality of care. *N Engl J Med.* 2003; 348:2218–2227.

3. Khuri SF, Daley J, Henderson W, et al. The Department of Veterans Affairs' NSQIP: the first national, validated, outcome-based, risk-adjusted, and peer-controlled program for the measurement and enhancement of the quality of surgical care. National VA Surgical Quality Improvement Program. *Ann Surg.* 1998; 228:491–507.

4. Grover FL, Shroyer AL, Hammermeister K, et al. A decade's experience with quality improvement in cardiac surgery using the Veterans Affairs and Society of Thoracic Surgeons national databases. *Ann Surg.* 2001;234:464–472.

5. Fisher ES, Welch HG. The future of the Department of Veterans Affairs health care system. *JAMA.* 1995;10:869–878.

6. Hynes DM, Kolling K, Stroupe K, et al. Veterans' access to and use of Medicare and Veterans Affairs health care. *Med Care.* 2007;45:214–223.

7. Weeks WB, Bott DM, Lamkin RP, Wright SM. Veterans Health Administration and Medicare outpatient health care utilization by older rural and urban New England veterans. *J Rural Health.* 2005;21: 167–171.

8. Wright SM, Daley J, Fisher ES, Thibault GE. Where do elderly veterans obtain care for acute myocardial infarction: Department of Veterans Affairs or Medicare? *Health Serv Res.* 1997;31:739–754.

9. Wright SM, Petersen LA, Lamkin RP, Daley J. Increasing use of Medicare services by veterans with acute myocardial infarction. *Med Care.* 1999;37: 529–537.

10. Weeks WB, O'Rourke DJ, Ryder LB, Straw MM. Veterans' care preference for coronary artery bypass grafting in a rural setting. *Milit Med.* 2002;167: 556–559.

11. Weeks WB, O'Rourke DJ, Ryder LB, Straw MM. Veterans' system-of-care preferences for percutaneous transluminal coronary angioplasty in a rural setting. *J Rural Health.* 2003;19:105–108.

12. Weeks WB, Bott DM, Bazos DA, et al. VA patients' use of the private sector for coronary revascularization in New York: opportunities to improve outcomes by directing care to high performance hospitals. *Med Care.* 2006;44(6):519–526.

13. Borowsky SJ, Cowper DC. Dual use of VA and non-VA primary care. *J Gen Intern Med.* 1999;14: 274–280.

14. Shen Y, Hendricks A, Zhang S, Kazis LE. VHA enrollees' health care coverage and use of care. *Med Care Res Rev.* 2003;60:253–267.

15. West AN, Weeks WB. Physical and mental health and access to care among nonmetropolitan VA patients younger than 65 years. *J Rural Health.* 2006;22:9–16.

16. Birkmeyer JD, Sharp SM, Finlayson SR, Fisher ES, Wennberg JE. Variation profiles of common surgical procedures. *Surgery.* 1998;124:917–923.

17. Birkmeyer JD, Siewers AE, Finlayson EV, et al. Hospital volume and surgical mortality in the United States. *N Engl J Med.* 2002;346:1128–1137.

18. Birkmeyer JD, Lucas FL, Wennberg DE. Potential benefits of regionalizing major surgery in Medicare patients. *Eff Clin Pract.* 1999;2:277–283.

19. Birkmeyer JD, Skinner JS, Wennberg DE. Will volume-based referral strategies reduce costs or just save lives? *Health Aff (Millwood).* 2002;21:234–241.

20. *International Classification of Diseases, Ninth Revision, Clinical Modification.* Hyattsville, Md: National Center for Health Statistics; 1980. DHHS publication PHS 80-1260.

21. Enrollment—provision of hospital and outpatient care to veterans—VA. Proposed rule. *Fed Regist.* 1998; 63(132):37299–37307.

22. Weeks WB, Mahar PJ, Wright SM. Utilization of VA and Medicare services by Medicare-eligible veterans in northern New England: the impact of additional access points in a rural setting. *J Health Care Manage.* 2005;50:95–106.

23. Weeks WB, Bazos DA, Bott DM, et al. New York's statistical model accurately predicts mortality risk for veterans who obtain private sector CABG. *Health Serv Res.* 2005;40:1186–1196.

24. Veterans Affairs Information Resource Center. VHA medical SAS datasets. Available at: http://www.virec.research.va.gov/DataSourcesName/Medical-SAS-Datasets/SAS.htm. Accessed August 27, 2007.

25. Veterans Affairs Information Resource Center. Research findings from the VA Medicare Data Merge Initiative. Available at: http://www.virec.research.va.gov/DataSourcesName/VA-MedicareData/USHreport.pdf. Accessed August 27, 2007.

26. Veterans Affairs Information Resource Center. Information on VA–Medicare data set. Available at: http://www.virec.research.va.gov/DataSourcesName/VA-MedicareData/Cohort.htm. Accessed August 27, 2007.

27. Birkmeyer JD, Dimick JB, Staiger DO. Operative mortality and procedure volume as predictors of subsequent hospital performance. *Ann Surg.* 2006;243: 411–417.

28. Birkmeyer JD, Siewers AE, Marth N, Goodman DC. Regionalizing high risk surgery and implications for patient travel times. *JAMA.* 2003;290:2703–2708.

29. Vladeck B, Goodwin E, Myers L, Sinisi M. Consumers and hospital use: the HCFA "death list." *Health Aff (Millwood).* 1988;7:122–125.

30. Hannan EL, Kumar D, Racz M, Siu AL, Chassin MR. New York State's Cardiac Surgery Reporting System: four years later. *Ann Thorac Surg.* 1994;58: 1852–1857.

31. Romano P, Zhou H. Do well-publicized risk-adjusted outcomes reports affect hospital volume? *Med Care.* 2004;42:367–377.

32. Birkmeyer J, Dimick J. Potential benefits of the new Leapfrog standards: effect of process and outcomes measures. *Surgery.* 2004;135:569–575.

33. Dimick JB, Weeks WB, Karia RJ, Das S, Campbell DA Jr. Who pays for poor surgical quality? Building a business case for quality improvement. *J Am Coll Surg.* 2006;202:933–937.